Niedersachsen

CUTEC NEWS

Merry Christmas and a Happy New Year

FACTS · INFORMATION · ANALYSES

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Christmas wishes

As you read this issue of CUTEC News, we are in the midst of the Advent period and Christmas is approaching fast. The pre-Christmas period is traditionally a time for children to be drawing up their wish lists and posting them off to Santa. Well, I am rather past the age of believing in Father Christmas. But if anyone – perhaps even a Father Christmas with the ear of the politicians – should ask me, purely hypothetically, what my wishes might be, I would most of all wish for consistency and reliability. It appears to me that, with regard to many issues, what is seen as the best solution one day is immediately placed in question again the next. I would wish, for example, for a long-term, stringently pursued strategy to be applied in answering the question of how our future energy supplies are to be safeguarded. I regard it as essential that the mobility of the individual should be maintained, and that our comfortable lifestyle should not be excessively restricted. Beyond the widely acknowledged goal of saving energy across the board, the solutions put forward with regard to the future energy mix much too often change direction, and so lack the desired consistency and reliability. It is pretty much beyond dispute, however, that renewables will play a major role in the energy mix of the future. That also, of course, includes energy recovered from the conversion of biomass. You will be aware that the various methods of biomass conversion are technology fields on which part of CUTEC's research efforts are focussed, since we regularly report on our projects in those fields in CUTEC News. A highly pleasing new development in this context last Summer was the founding by a number of investors of Biomass Conversion GmbH & Co. KG. The company is based, like us, in Clausthal-Zellerfeld, and will act as our cooperation partner in marketing the technology lines we develop.

This latest issue provides further evidence of how we at the CUTEC Institute are thinking about and working on viable technologies for the future and innovative solutions to today's problems. For sewage sludge dewatering, we have developed a regenerative, biodegradable flocculant based on starch capable of replacing current oil-based flocculants. Check out our report on the project we have just completed at the port of Hamburg. Next year, together with a number of partners, we will be hosting the fifth "Advanced Oxidation Processes" conference, timed to coincide with the "Wasser Berlin" water industry trade show. Experts from five continents will be meeting in Berlin to exchange views and discuss the latest scientific findings and technical developments in the field of waste water and sewage treatment. And finally, two years after the launch of the EU's BIOWELL project relating to the recovery of biogas from the fermentation of biomass, we report on the state of progress and the results achieved to date.

I very much hope that your own yuletide wishes will come true, and I wish you and your families, and all the employees of CUTEC, a very happy Christmas. Despite all the talk of crisis, let's head into 2009 full of optimism and with renewed vigour!

Best regards, Otto Carlowitz

IN THIS ISSUE

5th IWA Specialist Conference on Advanced Oxidation Processes (AOP5) – first time in Berlin

At the end of the 4th Conference in 2006 everyone in the "AOP family" had the same thought: "In 2009 we will meet in Goslar again!". In fact, things have turned out differently. On invitation from the organisers of the "Wasser Berlin" trade show, the 5th AOP Conference from March 30 to April 2, 2009 will for the first time be held outside of the Harz region, in Germany's capital. Under the leadership of CUTEC, the IWA (International Water Association), the Technical University of Berlin and – for the first time – also the IOA (International Ozone Association) within the scope of the 10th IOA-EA$_3$G Conference, are jointly organising one of the world's largest oxidation processes events in the wastewater and sewage field.

"It is important to appreciate the growing urgency of this issue and to reflect its global importance within an even broader international framework," explains Professor Dr.-Ing. Michael Sievers, head of

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5th International Advanced Oxidation Processes Conference (AOP5) held for the first time in Berlin

Scientific Committee and Planning Team for the 2006 Conference

department at the CUTEC Institute and Chairman of the IWA's "AOP" specialist group in justification of the move to Berlin. "The link to the "Wasser Berlin" show will generate additional incentives to attract even more visitors to the AOP, as the full spectrum of water and sewage engineering will be on show in one location". The large number of paper submissions for presentations (orals and poster) impressively affirms that view. The Scientific Committee had an unenviable job selecting the 44 oral presentations and approx. 150 poster presentations in view of the high standard of submissions received.

The aim of the event is to provide industry specialists with an update on the latest state of the art in oxidation technologies for the treatment of water and sewage. Leading experts from universities, colleges and institutions on every continent will be reporting on the key areas of focus, the results achieved to date and the very latest innovations. Alongside the conference, CUTEC is organising a joint stand at the trade show to present the results of work to date to an even broader spread of industry insiders.

Initiated in 1993 as a forum for German specialists in oxidation as means of water and sewage treatment, the conference has grown into one of the world's leading events concerned with research and development in innovative waste water and sewage technologies. Since then the Conference has been held every three years in the Harz region of Germany.

The oxidation processes being developed are specialist techniques for the treatment of contaminated water and sewage, enabling substances in the wastewater which are difficult to degrade to be converted into carbon dioxide, water and mineral salts.

For more information and details of how to register visit:
http://www.aop-conferences.de (kra)

Introducing the CUTEC Design and Construction working group

As the retirement date of longstanding CUTEC designer Dietmar Starke approached, die decision as to his successor had already been made. From a variety of potential alternatives, Professor Carlowitz decided to appoint two CUTEC employees to take on the role, and to prepare them for their new duties by undertaking the relevant qualification training. Technical draughtswoman Heike Eberhardt and master mechanical engineer Markus Lenk are currently undergoing part-time distance learning to qualify as CAD designers.

The research projects being conducted in the various operative departments often call for special apparatus and plant to be constructed. Since such equipment is not available "off the rack", a designer must be capable of turning the ideas put forth by the scientists and engineers into reality. The range of special requirements they must fulfill extends from producing draft designs, through revision of existing drawings and development of technical components to the complete construction of plant. Based on collaboration between scientists and engineers in the operative departments on the one hand and the workshop, design and construction staff on the other, CUTEC is able to meet those challenges and achieve results which optimally fulfill the technical and scientific requirements made.

Photo: K.-M. Schenk, CUTEC-Institut GmbH

Heike Eberhardt (left) and Markus Lenk measuring up an item of plant

The key tool of a designer in the modern world is a computer running specialist

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Starch-based flocculant proves its worth in harbour silt dewatering

Successful project conclusion; continuation of activities planned

In order to sustain the commercial viability and competitiveness of the port of Hamburg, between two and four million cubic metres of sediment must be dredged up from the river Elbe every year so as to keep the shipping lanes clear. The METHA III* (pictured below) is the world's first large-scale sediment processor to provide mechanical separation of harbour sediment into uncontaminated sand for use as building material and polluted silt requiring landfill disposal. The system thickens the polluted silt in two flocculation stages (so-called dual flocculation) and in a third stage the silt is flocculated and then dewatered. At present, standard commercially available polymers based on crude oil are still the only method employed for flocculation, resulting in detrimental effects such as increased fish toxicity. The three-year project sponsored by the FNR Agency for Renewable Resources proved that it is commercially viable to substitute these polymers by ionic flocculants based on starch. The advantages of starch products lie in their climate-neutral raw material base, their biodegradability, their low production cost and the opportunity of independence from declining oil resources which they offer. The CUTEC Department of Physical and Biological Processes participated in the METHA III project, in cooperation with the Institute of Technical and Macromolecular Chemistry at the University of Hamburg, starch manufacturer Emsland-Stärke GmbH based in Emlichheim, and the Hamburg Port Authority. After having successfully demonstrated the commercial viability of substituting the cationic polymers of the first and third flocculation stages on a laboratory scale, the next aim was to confirm those results by a pilot run of the METHA system. To run the pilot, a container-housed pilot plant (pictured above) developed by CUTEC was integrated downstream of the sand separation/classification process to simulate the METHA plant's flocculation and dewatering processes. The first flocculation stage was substituted by a starch product at just half the consumption quantity. To substitute the third flocculation stage a triple dosage of the starch product was required. This is still commercially viable, however, as the starch product only costs about a third as much as the polymer. Additional advantages of the starch products over polymers were their higher initial concentration (lower water consumption), shorter maturing time and improved storage stability (with the matured starch product exhibiting a high degree of efficiency even after two weeks in storage).

Container pilot plant on the METHA III

Aerial photo of the METHA III

On attaining the required residual moisture, cake weight and shear stability, it was possible to verify the suitability of the starch-treated and then dewatered harbour silt for landfill disposal. Employing the already familiar flocculation system developed by CUTEC – comprising a flocculation reactor and sensor – the dewatering results were even improved by a further approximately three to four percentage points. Looking ahead, it should be mentioned that Emsland-Stärke GmbH see still further potential for optimising the modified starch, and the Hamburg Port Authority is seriously considering using these starch products on the METHA plant. This would then mean that the goal of bringing to market renewables-based products has been attaine. (nie)

*German acronym for mechanical separation of harbour silt

IMPRESSUM

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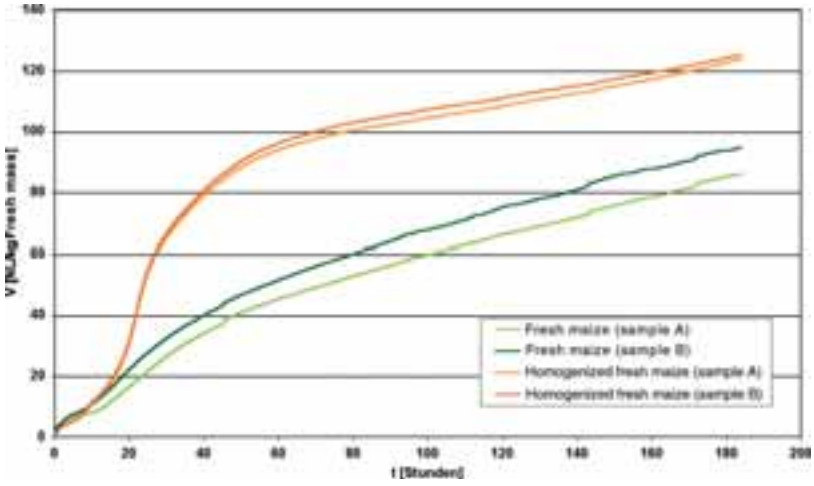
BIOWELL project begins technical pilot phase

"BIO-energy WELL" now on a large scale

The EU BIOWELL project (Increased Renewable Energy Recovery from Biomass by highly Efficient Disruption Process) is moving into its technical pilot phase. On successful completion of the almost two-year research and development work aimed at increasing the efficiency of biogas plants by biomass pretreatment, the technical pilot plant for demonstration and commercial appraisal of the new process is now almost finished.

In times of rising raw material (substrate) prices, more and more biogas plants are reaching the limits of their commercial viability. This is influenced by factors including the biogas yield (the quantity of recovered biogas relative to the quantity of input biomass). In this context, the degree of conversion of energy bound in the biomass into the gaseous energy source methane is dependent on a range of different factors. As well as substrate-specific factors, the key criteria determining the efficiency of the biological energy conversion process (anaerobic fermentation) are the prevailing process conditions, the plant-operating mode and the availability of biomass for the microorganisms. This is the area of focus of the BIOWELL project, which is funded to the tune of 1.3 million Euro by the European Union and coordinated by CUTEC. Participants in the cooperation project include three research institutions as well as five small and medium-sized enterprises (SMEs) from a total of six European countries.

In a first project phase (see CUTEC News from October 2006) the participating research bodies systematically investigated the influence of various biomass reduction (disruption) methods on the biogas yield. The main focus of CUTEC's role in this was on low-pressure homogenization, biogas measurement and process assessment and optimization. Using the high-precision gas-measuring cells developed by CUTEC (pictured bottom left), the respective biogas and methane yields with and without pretreatment were recorded, automatically scaled and balanced. The graphic above clearly shows the influence of the homogenization of biomass (here fresh maize) on the biogas yield. The laboratory results obtained so far indicate that biomass pretreatment offer significant potential for increasing biogas yields.



The biogas yield (in standard litres per kg fresh mass) of the homogenized samples (red) is significantly increased

In the second project phase (the demonstration phase),which has now begun, the positive laboratory results will be verified on a technical scale and their commercial potential appraised.

To that end, the project consortium has developed a prototype essentially comprising two parallel-running 1000L model biogas plants, of which one is operated by the disruption method under test (pictured right) while the other serves as a control. Following on from the technical pilot phase, the plan is to market this technology jointly, under the coordination of the participating SME partners. End-users United Biofuels Holdings Europe AG and Agricapital AG have already signalled their intention to deploy the prototype on completion of the project in real biogas plants in preparation for the market launch. (schl)

Apparatus for biogas potential measurement

The homogenizer is the "heart" of the technical pilot plant

DIARY

CUTEC joint stand
at Wasser Berlin 2009
International trade fair and congress
from 30 March to 3 April, 2009
Berlin trade fair centre

5th International Conference on
Advanced Oxidation Processes (AOP5)
from 30 March to 2 April, 2009
Berlin trade fair centre
For more information visit:
www.aop-conferences.de/

CUTEC trains delegation from Nigeria in water and sewage treatment

Group photo of the delegation with Professor Carlowitz and Dr. Onyeche in front of the CUTEC building

As far back as June 2006, CUTEC signed a consulting contract with the Nigerian central government (see CUTEC News 2/2006) which resulted in the first training course – in waste management – being held between 28 February and 14 March, 2007 (see CUTEC-News 6/2007). This time around, nine members of staff from the FCT* in Abuja attended a course in integrated waste water and sewage treatment held at CUTEC. The Nigerian delegation included Engr. K. N. Okafor, Director AEPB (Abuja Environmental Protection Board); Mr. U. J. Agbanusi, Deputy Director NES (Nigerian Environmental Society); Ms. O. O. Olanipekun, responsible for environmental analyses; Ms. D. N. Okenewe, Special Waste department; Barr. K. M. Imam, Legal Affairs department; Engr. R. Usman, Engineering; Mr. M. Affi, responsible for treatment plants; Engr. D. H. Abukabar, responsible for solid waste; and Mr. A. A. Ja'afar, responsible for the sewer system.

The lecturers – here Dr. Fischer from CUTEC – were well received by an interested and knowledgeable audience

The prime movers in organising and conducting the training course were CUTEC Manager of International Operations Dr.-Ing. T. Onyeche, Professor Dr.-Ing. Michael Sievers and Dipl.-Ing. Sven Schäfer. The first part of the course dealt included presentations on the various fields of waste water and sewage treatment, such as general waste water and sewage treatment, sludge treatment and dewatering, oxidation processes, more detailed waste water and sewage treatment, membrane processes, groundwater, analysis and decentralised and naturally-based waste water and sewage concepts. Alongside the presentations, workshops were held on the subjects of oxidation and membrane processes, sludge flocculation and biogas in the CUTEC laboratories and on-site at various technical plant locations. Of particular interest was the question of how to apply the innovative techniques demonstrated in the presentations and workshops to the specific circumstances in Nigeria.

The second part of the event comprised visits to the landfill leachate treatment plant in Braunschweig (Brunswick), the Wassmannsdorf sewage treatment plant near Berlin, the Köhlbrandhöft sewage treatment plant and the METHA harbour sediment separation unit in Hamburg. The expert presentations and impressive site tours not only provided a comprehensive insight into the practical aspects of waste water and sewage treatment, they also offered valuable guidance on how to implement such systems in Nigeria. The traditional visit to the Nigerian Embassy in Berlin also formed part of the schedule. The delegation was received by the Deputy Ambassador. The head of the Nigerian delegation, Mr. Okafor, reported on the training course and on the possibilities demonstrated for applying what the participants had learned in Nigeria. In reply, the Deputy Ambassador stated that he knew that the participants were in good hands with CUTEC, as the high quality of the Institute's work and the training it provides is well-known and highly respected in Nigeria. He suggested that not only members of the government from Abuja should be given the opportunity to attend CUTEC training courses, but also technical specialists from other parts of the country, in view of the unique quality and range of training offered by the Institute.

In the workshops, the participants had the opportunity to try out their theoretical knowledge in practice. In the centre of the picture Dipl.-Ing. H. Bormann, CUTEC.

At the end of the event the participants all agreed that they had been provided with a comprehensive overview of the subject of integrated waste water and sewage treatment. Mr. Okafor expressed his thanks once again for the interesting training and the experience the participants had been able to gather. He stated that the mix of theory teaching and practical demonstration had provided them with important help and ideas on how to implement environmental technology in Nigeria. He went on to say that he would be pleased to have the opportunity to participate in other CUTEC training courses. (schä)

Tour of the METHA processing plant in Hamburg

*Federal Capital Territory

CUTEC Manager of International Operations on trip to India and China

Dr.-Ing. Onyeche joins business delegation headed by Minister-President Wulff

The Indian Prime Minister Manmohan Singh (left) and Dr.-Ing. T. Onyeche

On 2 October, CUTEC Manager for International Operations, Dr.-Ing. Onyeche, set off with a German delegation comprising of about 80 business excutives on an eleven-day business trip to India and later to China. The delegation was headed by Minister-President of the state of Niedersachsen, Mr. Christian Wulff, accompanied by the state's Minister of Science and Culture, Mr. Lutz Stratmann. The focus of the trip was to strengthen Niedersachsen's existing political, economic, scientific and cultural ties with India and China. The delegation comprised of representatives from businesses and centres of higher education in Niedersachsen, as well as from the German Management Academy in Celle, Germany and a number of journalists. In India, the delegation visited the cities of Mumbai, Pune and New Delhi. Whilst in Mumbai, the Minister-President officially opened the laison office of the state of Niedersachsen, as a future local point of contact for businesses from the region. Events in Pune included the commissioning of a new Volkswagen plant and a laison office of the University of Göttingen at the local university campus, which is one of the top centres of higher education in India. In China, the delegation visited Beijing, Nanjing and the partner province to Niedersachsen, Anhui. After talks with high-ranking politicians, the delegation toured a new Beijing plant of Sartorius AG. The delegation had the opportunity at various locations to engage in business-matching meetings. Dr.-Ing. Onyeche met with many environmental technology and research companies during the trip, and discussed the possibilities of cooperation with CUTEC. He used the trip also to find out about the ecological situation in various locations visited as well as to investigate the possibilities for CUTEC and other Niedersachsen companies to enter into project negotiations. (on)

Report from the Workers' Council:

In November 2008 changes were made to the TV-L* collective pay agreement, which had replaced the BAT* agreement for federal civil servants two years previously. The TV-Ü-Länder* transitional agreement provides more details on the transition of November 2006 and on the transition legislation. The TV-L also makes special provisions for centres of higher education and research bodies, and thus also affecting CUTEC. The main aims of the collective pay reform were to make the German civil service more attractive to new recruits, to reward employees more closely in line with their performance, and to simplify collective pay legislation. That was at least the theory – and theory is of course a grey area. The experience of the Workers' Council with the TV-L to date has been as follows:

1. The targeted attractiveness to new recruits is not reflected in the jobs advertised. For married people with children in particular, the posts are financially unattractive because of the termination of relevant benefits.
2. No comprehensible and communicable criteria for performance assessment have yet been laid down, and none are to be expected, at least in the medium term.
3. The demand for advice is immense, because the various regulations (TV-Ü-Länder, TV-L and referrals back to the BAT) in some cases apply simultaneously. This very much contradicts the forecast simplification.
4. The elimination of Christmas and holiday bonuses has resulted in decreases of over 5 % of their annual salary package for some staff. (ze)

*TV-L: German federal states' collective pay agreement / *BAT: Federal civil servants' collective pay scale / *TV-Ü: Transitional collective pay agreement

Continuation from page 2

Introducing the CUTEC Design and Construction working group

CAD (Computer Aided Design) software. The Design and Construction working group uses the MEDUSA 3.0.1 2D/Drafting system. CAD enables machinery, equipment and plant to be virtually created in the form of geometric data and visually depicted on-screen. The specifications and plans drawn up by the designers form the basis for the CUTEC workshops which actually make the required items. (so)

Christmas Day

THE Christmas chimes are pealing high
Beneath the solemn Christmas sky,
And blowing winds their notes prolong
Like echoes from an angel's song;
Good will and peace, peace and good will
Ring out the carols glad and gay,
Telling the heavenly message still
That Christ the Child was born to-day.

In lowly hut and palace hall
Peasant and king keep festival,
And childhood wears a fairer guise,
And tenderer shine all mother-eyes;
The aged man forgets his years,
The mirthful heart is doubly gay,
The sad are cheated of their tears,
For Christ the Lord was born to-day..

Susan Coolidge